Complex Conjugates

- The conjugate of $z = a + bi$ is $\bar{z} = a - bi$.
- The sign of the imaginary part changes.
- On an Argand diagram, z and $\bar{z}$ are reflections in the real axis.
- The product of a complex number and its conjugate is always real, and this is useful when dividing complex numbers.

Questions

1) Let $u = 3 + 4i$ and $v = -5 - i$. Find: **a)** $\bar{u} \cdot \bar{v}$, **b)** $\bar{u} + v$

a) $\bar{u} \cdot \bar{v} = (3 - 4i)(-5 + i) = -15 + 3i + 20i - 4i^2 = -15 + 23i - 4(-1)$
$= -11 + 23i$

b) $\bar{u} + v = (3 - 4i) + (-5 - i) = 3 - 5 - 4i - i = -2 - 5i$

2) Calculate $(17 + 19i) \div (2 + 3i)$

$$\frac{17+19i}{2+3i} = \frac{(17+19i)\times(2-3i)}{(2+3i)(2-3i)} = \frac{34-51i+38i-57i^2}{4-6i+6i-9i^2} = \frac{34-13i-57(-1)}{4-9(-1)} = \frac{91-13i}{13} = 7 - i$$

Delta Ex 30.5 pg 281, Ex 30.6 pg 282